LG DISPLAY CO., LTD., Plaintiff, v. CHI MEI OPTOELECTRONICS CORPORATION, et al. Defendants.	)	Civil Action No. 06-726 (JJF) Civil Action No. 07-357 (JJF) CONSOLIDATED CASES

DECLARATION OF DR. POCHI YEH

I, Pochi Yeh, Ph.D. do hereby declare and state:

1. I am a citizen of the United States, and reside at 405 Camino De Celeste, Thousand Oaks, CA 91360.

2. I have over 40 years of experience in physics and optical technology. More than 15 years of that period was spent working with optical technology in the private sector, and I have been a professor of electrical and computer engineering at the University of California at Santa Barbara for 18 years. I hold over 30 U.S. Patents dealing with optical technology, and have published five textbooks on the subject of optical physics and liquid crystal displays ("LCDs"). My C.V. is attached as Exhibit A.

3. In order to prepare for this declaration, I have thoroughly reviewed the specification, drawings and claims of U.S. Patent No. 5,619,352 ("the '352 patent") and U.S. Patent No. 6,134,092 ("the '092 patent"). In addition, I have also reviewed product specifications, and relied on my general knowledge of LCD design acquired through my years of experience as a researcher and practitioner in the field of optical physics and liquid crystal displays.

4. I do not have any current affiliations with CMO, other than the present engagement, for which I am being compensated for my time at the rate of $650.00 per hour.

5. Based upon my knowledge of optics and experience in the LCD industry, a person of ordinary skill in the art for the '352 patent would have a degree in engineering. physics or materials, two to three years working experience in the LCD industry, knowledge of LCD design, knowledge of LCD materials and material properties, and knowledge of methods for evaluating LCD optical performance.

6. Based upon my knowledge of optics and experience in the LCD industry, a person of ordinary skill in the art for the '092 patent would have a degree in engineering or physics, two to three years working experience in the LCD industry and knowledge of LCD design.

7. The '352 patent discloses optical compensators that improve contrast ratios and gray scale stability of LCDs over a wide range of viewing angles. Claim 29 of the ’352 patent recites in part "a desired viewing characteristic over a specified field of view." One skilled in the art would understand this term to be mean: a contrast ratio that exceeds a threshold for a specified range of viewing angles. The contrast ratio is a luminance at a bright state divided by a luminance at a dark state.

8. It is common practice in the LCD industry to provide product specifications that list the contrast ratio and viewing angles. For example, the specification for the CMO V420H1 LCD television describes horizontal and vertical viewing angles of 88º. A copy of the product specification is attached as Exhibit B and a relevant portion of the specification is reproduced below:

42"H1(V420H1)

Products >> LCD TV Panels >> 42"H1(V420H1)

Model Name	V420H1
Panel Size	42"
Technology	LCS MVA
Resolution	1920x1080
Number of Pixels	2.1M x (R,G,B)
Pixel Pitch(mm)	0.4845
PPI	52
Active Area(mm)	930.2x523.3
Outline(mm) (w/inverter)	983x576x52.3
Luminance(nits)	500
View Angle (U/D/R/L,CR>20)	88/88/88/88
Contrast Ratio	2000:1

9. LGD also specifies viewing angles in its product specifications. For example, the LG 42LG60 LCD television describes viewing angles of 178º. A copy of the product specification is attached as Exhibit C and a relevant portion of the specification is reproduced below:

42LG60

TECHNICAL SI

LCD PANEL	
Native Display Resolution	1920 x 1080p
Brightness (cd/m²)	500
Dynamic Contrast Ratio	50,000:1
Viewing Angle	178° x 178°
Response Time (Grey to Grey)	4ms
Wide Color Control	•
TruMotion 120Hz	•
Life Span (Typical)	60,000 hours

10. The viewing angles are determined by measuring the luminance at dark and bright states for different viewing angles. The specified viewing angle is the angle at which the contrast ratio is below a specified value. For example, for the LGD 42LG60 the 178º viewing angle is the angle at which the contrast ratio is below a threshold, typically 10:1. For example, the Samsung specification attached as Exhibit D discloses a threshold ratio of 10:1 ("(CR>10)").

11. The '092 patent discloses an illumination device that can illuminate a device such as an LCD. The illumination device is structured so that a peripheral portion of a waveguide is substantially uniformly illuminated.

12. It is my understanding that LGD believes that the term "peripheral portion" means "boundary adjacent a side edge". The ’092 patent discloses embodiments that substantially uniformly illuminate a peripheral portion of a waveguide.

13. One of the embodiments is shown in Figure 13 of the drawings, which is reproduced below:

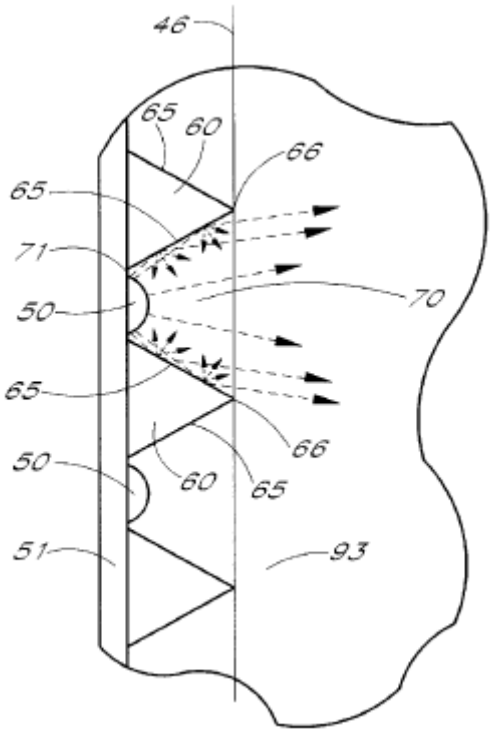

FIG. 13

14. Figure 13 shows a series of triangular shaped guide members 60 that each have reflective surfaces 65. Each guide member has an apex 66 that intersects the edge of the waveguide 46.

15. Because the apexes are in contact with the waveguide edge, very little, if any light will travel in those portions of the edge. As a result, the device will not produce uniform light distribution along the edge of the waveguide, and there will be a series of dark(er) lines at the apexes of each guide member.

16. Claim 5 of the ’092 patent recites "light-emitting diodes". This term is well known in the art. It is a solid state device that emits light in response to a biasing voltage and a driving current.

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I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dr. Ponchi Yeh

8/10/2008
Date

EXHIBIT A

Pochi Yeh

Electrical and Computer Engineering, University of California Santa Barbara
Santa Barbara, California 93106
Email: Pochi@ece.ucsb.edu

Education:

1973 - 1977	California Institute of Technology	PhD	Physics
1973 - 1975	California Institute of Technology	MS	Physics
1967 - 1971	National Taiwan University	BS	Physics

Employment History:

1990 - present	Professor Electrical and Computer Engineering University of California at Santa Barbara
1985 - 1990	Principal Scientist Rockwell International Science Center
1988 - 1990	Acting Manager / Optical Information Processing Department
1988	Acting Manager / Applied Optics Department
1977 - 1985	Member of Technical Staff Rockwell International Science Center
Spring 1989	Visiting Professor University of California, Santa Barbara
1987 - present	Adjunct Professor / Electrophysics Department National Chiao Tung University
Summer 1985	Visiting Professor / Physics Department National Taiwan University
Summer 1984	Visiting Professor / Electrophysics Department National Chiao Tung University
Summer 1982	Visiting Associate Professor / Physics Department National Taiwan University
1973 - 1977	Teaching and Research Assistant / Caltech
1971 - 1973	Physics Instructor (military service) Army Ordnance School, Taiwan

Honors and Awards:

2002	Distinguished Alumnus Award (Cheng-Yuan High School, Taipei)
1998	OSA Fellow Traveling Lecturer
1995	Fellow of Photonics Society of Chinese-Americans
1991	Fellow of IEEE
1990	Rudolf Kingslake Medal and Prize for Year 1989 International Optical Engineering Society
1990	Distinguished Lecturer Award, National Science Council Republic of China
1988	Fellow of Optical Society of America (OSA)
1987	United Nations Lectureship, Chinese Academy of Sciences
1986	Leonardo da Vinci Award, "Engineer of the Year" for Year 1985

Professional Services:

2007	Member of Program Committee, Photonics Asia 2007 (Beijing) Conference on Information Optics and Photonics Technology
2007	Member of Program Committee, Photonics Asia 2007 (Beijing) Conference on Nonlinear Optics and Applications
2007	Member of International Program Committee, ICOLA'2007 (Indonesia)
2007	Co-chair of Technical Program Sub-committee on Optical Information Processing and Storage The 7th Pacific Rim Conference on Lasers and Electro-Optics (CLEO-PR 2007, Seoul, Korea)
2006	Member of Organizing Committee, OECC'2006
2005	Member of International Advisory Committee International Conference on Optics and Optoelectronics (ICOL-2005)
2004	Program committee member on Nonlinear Optics and Applications Program committee member on Information Optics and Photonics Technology Photonics Asia 2004 (International Society for Optical Engineering)
2003	Program Chair of Subcommittee on Optical Switching, Computing and Information Processing, CLEO Pacific Rim'2003
2002- present	Member of Editorial Board Chinese Optics Letters (formerly Chinese Journal of Lasers B)
2000- present	Member of International Advisory Board Optical Review (Optical Society of Japan)
1999-2002	Program Co-chair, Optics in Computing'2002 International Commission on Optics (ICO) and OSA
1999-2000	Symposium Chair and Program Co-Chair 2000 International Photonics Conference (Hsinchu, Taiwan, December 12-15, 2000)
2000-2001	Technical Program Subcommittee Member Quantum Electronics Laser Science Conference (QELS, 2001)

1999-2000	Technical Program Subcommittee Member Conference on Laser and Electro-Optics (CLEO, 2000)
1998-1999	Member of Program Committee International Conference on Microwave and Photonics (Rio de Janeiro, August 9-12, 1999)
1998-1999	Member of Program Committee Seventh Topical Meeting on Photorefractive Materials (Koln, Denmark, June 1999)
1998-1999	Guest Editor of Journal of Displays Special issue on Viewing Improvement of LCDs
1997-1998	Symposium Chair and Conference Co-Chair 1998 International Photonics Conference (Taipei, Taiwan, December 16-18, 1998)
1998-1999	Member of Technical Program Committee CLEO/Pacific Rim'99 (Seoul, Korea, 1999)
1997-1998	Member of Advisory Committee Topical Meeting on Nonlinear Optics (NLO'98, Kauai)
1997	Program Co-chair North American Chinese Photonics Technology Conference (Los Angeles, California, October 17-19, 1997)
1996-1997	Member of Technical Program Committee CLEO/Pacific Rim'97 (Tokyo, Japan, 1997)
1995-1996	Member of Advisory Committee (NLO'96) Topical Meeting on Nonlinear Optics (Maui, 1996)
1995	Chairman of International Committee (ICNOPA'95) Int'l Conference on Nonlinear Optical Physics and Applications
1994-1995	Member of Technical Program Committee CLEO/Pacific Rim'95 (Tokyo, Japan, 1995)
1994 - present	Member of Steering Committee Topical Meeting on Nonlinear Optics (NLO)
1994 - 1995	Chairman of 1995 PSC Fellow Committee Photonics Society of Chinese-Americans (PSC)
1994	Member of IEEE/LEOS Fellow Committee
1993 - 1994	Member of Program Committee (NLO'94) Topical Meeting on Nonlinear Optics (Hawaii,1994)
1993	Member of International Program Committee Second International School and Topical Meeting on Applications of Nonlinear Optics (Prague, August 16-20, 1993)

1993 - 1999	Member of Board of Directors Photonics Society of Chinese-Americans
1993	Conference Co-Chair of First World Optics Conference (WOC'93) (Shanghai, Aug. 30- Sept. 3, 1993)
1992 - 1993	Chairman of 1993 PSC Fellow Committee Photonics Society of Chinese-Americans (PSC)
1992 - 1994	Member of LEOS Technical Committee on NLO (IEEE/LEOS)
1992	Symposium Co-Chair, OCCC'92 (SPIE)
1991 - present	Member of Board of Editors International Journal of Nonlinear Optical Physics
1992	Chairman of Board of Directors Photonics Society of Chinese-Americans
1991	President of Photonics Society of Chinese-Americans
1991 - 1992	Conference Co-Chairman of NLO'92 (OSA)
1989 -	Chairman of LEOS Technical Committee on NLO (IEEE/LEOS)
1988 - 1990	Member of Technical Program Committee of CLEO'89 and CLEO'90
1988 - 1989	Member of FASAC Committee on Phase Conjugation
1989 - 1990	Program Co-Chairman of Nonlinear Optics Conference (IEEE/LEOS)
1986 - 1990	Cochair and Committee Member of Topical Meeting on Photorefractive Materials, Effect and Devices (OSA)
1986 - 1989	Associate Editor of Chinese Physics Lasers (a publication of the American Institute of Physics)
1986 - 1987	Chairman of 1988 Frederic Ives Medal Award Committee (OSA)
1985 - 1988	Committee Member of Frederic Ives Medal Award (OSA)
1986	Program Chairman of OE/LASE'87
1986 - present	Cochairman of Conference on Phase Conjugation, Adaptive Optics and Raman Beam Combining at OE/LASE'87
1986	Cochairman of Conference on Optical and Digital Pattern Recognition at OE/LASE'87
1985	Chairman of Conference on Nonlinear Optics and Applications at OE/LASE'86

Industrial Consulting:

2006-present	Technology Advisor, Crysoptix, Ltd. (Russia)
2004-present	Expert witness in Patent Infringement Litigations Mitsubishi, Fujitsu, AU Optronics (AUO), Chunghwa Picture Tubes (CPT), ChiMei Optoelectronics (CMO), ChemImage Corp., InnoLux
2004-2006	Technology Advisor, Oplink Communications
2003-	Advisor, Industrial Technology Research Institute (ITRI, Taiwan)
2000-2005	Member of Technical Advisory Board, Optiva, Inc.
2001-2004	Co-Founder, Chairman and Chief Scientific Advisor, Accumux Technologies, Inc.
1990-2001	Principal Technical Advisor, Rockwell Science Center
2000	Cree
1991-1994	TRW Inc.
1992	Boeing
1991-1995	JPL (Distinguished Visiting Scientist)

Patents: Over 30 US Patents issued

Publications: Over 400 technical papers

Textbooks:

1. “Optical Waves in Crystals,” (with A. Yariv), Wiley, 1984.
2. “Optical Waves in Layered Media,” Wiley, 1988.
3. “Introduction to Photorefractive Nonlinear Optics,” Wiley, 1993.
4. “Optics of Liquid Crystal Displays,” (with C. Gu), Wiley, 1999.
5. "Photonics," 6-th edition (with A. Yariv), Oxford, 2006.

PUBLICATION LIST OF POCHI YEH

Part I. Papers

1. "Confinement and Stability in Optical Resonators Employing Mirrors with Gaussian Reflectivity Tapers" (with A. Yariv), Opt. Comm. 13, 370 (1975).

2. "10.6 Micron Parametric Frequency Converter" (with R.L. Abrams et al), Opt. Comm. 18, 221 (1976).

3. "Prospectives of Free Electron Lasers" (with A. Gover and A. Yariv), Opt. Comm. 18, 221 (1976).

4. "Bragg Reflection Waveguides" (with A. Yariv), Opt. Comm. 19, 427 (1976).

5. "Stark-Induced Three-Wave Mixing in Molecular Gases" (with R.L. Abrams and A. Yariv), IEEE J. Quant. Electron QE-13, 79 (1977).

6. "Electromagnetic Propagation in Periodic Stratified Media: I. General Theory" (with A. Yariv, C.S. Hong), J. Opt. Soc. Am. 67, 423 (1977).

7. "Electromagnetic Propagation in Periodic Stratified Media: II. Birefringence, Phase Matching and X-Ray Lasers" (with A. Yariv), J. Opt. Soc. Am. 6, 438 (1977).

8. "Observation of Confined Propagation in Bragg Waveguides" (with A. Cho and A. Yariv), Appl. Phys. Lett. 30, 471 (1977).

9. "X-Ray Laser Oscillation in Artificial Layered Media" (with A. Yariv), Opt. Comm. 22, 5 (1977).

10. "Waveguiding in Bragg Configurations" (with A. Yariv), Device Res. Conf., Ithaca, NY (June 1977).

11. "Optical Surface Waves in Periodic Layered Media" (with A. Cho and A. Yariv), Appl. Phys. Lett. 32, 104 (1978).

12. "Statistical Analysis of Bragg Reflectors" (with J. Shellan, P. Agmon and A. Yariv), J. Opt. Soc. Am. 68, 18 (1978).

13. "Optical Surface Waves in Periodic Layered Medium Grown by Liquid Phase Epitaxy" (with W. Ng, P. Chen and A. Yariv), Appl. Phys. Lett. 32, 370 (1978).

14. "Transverse Bragg-Reflector Injection Lasers" (with J. Shellan, W. Ng, A. Yariv and A. Cho), Opt. Lett. 2, 136 (1978).

15. "Theory of Bragg Fibers" (with A. Yariv and E. Marom), J. Opt. Soc. Am. 68, 1196 (1978).

16. "A New Optical Model for Wire Grid Polarizers" Opt. Comm. 26, 289 (1978).

17. "The Application of Gaussian Beam Formalism to Optical Propagation in Nonlinear Media" (with A. Yariv), Opt. Comm. 27, 295 (1978).

18. "Optical Surface Waves in Perfect and Imperfect Periodic Layered Media (with A. Yariv et al), Tech. Digest, Topical Meeting on Integrated and Guided-Wave Optics, Salt Lake City, UT (January 16-18, 1978).

19. "Optical Propagation in Bragg Fibers" (with A. Yariv and E. Marom), Tech. Digest, Topical Meeting on Integrated and Guided Wave Optics, Salt Lake City, UT (January 16-18, 1978).

20. "Bragg Waveguide GaAs Injection Lasers" (with A. Yariv et al) Post-deadline paper, Topical Meeting on Integrated and Guided-Wave Optics, Salt Lake City, UT (January 16-18, 1978).

21. "New Optical Phenomena in Birefringent Layered Media," J. Opt. Soc. Am. 68, 1423 (1978).

22. "Multilayer Narrowband Electro-Optical Tunable Filter" (with J. Tracy), J. Opt. Soc. Am. 68, 1449 (1978).

23. "Transmission Spectrum of a Solc Filter," Opt. Comm. 29, 1 (1979).

24. "Electromagnetic Propagation in Birefringent Layered Media," J. Opt. Soc. Am. 69, 742 (1979).

25. "Electro-Optic Tunable Filter Structures," SPIE, Vol. 202, Active Optical Devices, 2 (1979).

26. "Multiple-Cavity Infrared Electro-Optic Tunable Filter" (with W. Gunning), SPIE Vol. 202, Active Optical Devices, 21 (1979).

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29. "Electro-Optically Induced Transmission," J. Opt. Soc. Am. 69, 1483 (1979).

30. "Contradirectional Frequency-Selective Couplers for Guided-Wave Optics" (with H.F. Taylor), Appl. Opt. 19, 2848 (1980).

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33. "Zero Crossing Birefringent Filters," Opt. Comm. 35, 15 (1980).

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35. "Zero-Crossing Birefringent Filters," J. Opt. Soc. Am. 70, 1628 (1980).

36. "Dispersive Birefringent Filters," Opt. Comm. 37, 153 (1981).

37. "Theory of Dispersive Birefringent Filters" (with J. Tracy) Proc. SPIE 268, 171-177 (1981).

38. "Generalized Model for Wire Grid Polarizers," Proc. SPIE, Vol. 307, Polarizers and Applications, 13-21, (1981).

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40. "A 2 x 2 Matrix Method for Wide-Field Birefringent Networks," J. Opt. Soc. Am. 71, 1573 (1981).

41. "Dispersive Birefringent Filters for Blue-Green Communications" (with W. Gunning and J. Tracy), J. Opt. Soc. Am. 71, 1629 (1981).

42. "Extended Jones Matrix Method," J. Opt. Soc. Am. 72, 507-513 (1982).

43. "Dispersive Magneto-Optic Filters," Appl. Opt. 21, 2069-2075 (1982).

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45. "Gyrotropic Isoindex Filter," Appl. Opt. 21, 4054-4058 (1982).

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47. "Gyrotropic Iso-Index Filters," J. Opt. Soc. Am. 72, 1114 (1982).

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51. "Electromagnetic Propagation in a Photorefractive Layered Medium," J. Opt. Soc. Am. 73, (10) 1268-1271 (1983).

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54. "Spectral Distribution and Inverse Problem in Gradient-Index Imaging Media," 4th Topical Meeting on Gradient-Index Optical Imaging Systems, Kobe, Japan (July 4-5, 1983).

55. "Application of Gratings to Semiconductor Lasers," Invited Paper, Guided-Wave and Integrated Optics Symp., Taipei, Taiwan (July 7-15, 1983).

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62. "Phase-Conjugate Ring Gyros," Workshop on Physics of Ring Laser Gyros, Snowbird, UT (January 7-10, 1984).

63. "Basic Principles of Lasers and Electro-Optics," Invited Lectures, Laser School '84, Hsin-Chu, Taiwan (February 6-17, 1984).

64. "Double Phase-Conjugate Resonators as Relative Position Sensors" (with M. Khoshnevisan, M. Ewbank and J. Tracy), J. Opt. Soc. Am, A1, 1212 (1984).

65. "Time Reversal Experimental Using Double Phase-Conjugate Michelson Interferometer" (with M. Ewbank, M. Khoshnevisan and J. Feinberg), J. Opt. Soc. Am., A1, 1212 (1984).

66. "Resonant Tunneling of Electromagnetic Radiation in Superlattice Structures," J. Opt. Soc. Am. A2, 568-571 (1985).

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68. "Time Reversal by an Interferometer with Coupled Phase-Conjugate Reflectors" (with M.D. Ewbank, M. Khoshnevisan and J. Feinberg), Opt. Lett. 10, 282-284 (1985).

69. "Theory of Unidirectional Photorefractive Ring Oscillators," J. Opt. Soc. B2, 1924-1928 (1985).

70. "Frequency Shift and Cavity Length in Photorefractive Resonators" (with M.D. Ewbank), Opt. Lett. 10, 496-498 (1985).

71. "Beam Cleanup using Photorefractive Two-Wave Mixing" (with A.E.T. Chiou), Opt. Lett. 10, 621-623 (1985).

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74. "Beam Cleanup using Photorefractive Two-Wave Mixing" (with A.E.T. Chiou), J. Opt. Soc. Am. A2 (13), 62-63 (1985).

75. "Phase-Conjugate Fiber Optic Gyros," (with I. McMichael and M. Khoshnevisan), J. Opt. Soc. Am. A2 (13), 67 (1985).

76. "Photorefractive Resonators" (with M. Ewbank), J. Opt. Soc. Am. A2 (13), 76 (1985).

77. "Phase Conjugate Optics" (with Peter Shih), Opto-News 5, 1 (1985).

78. "Fidelity of Passive Phase Conjugators" (with M. Ewbank) Nonlinear Optics and Applications, Pochi Yeh, Ed., Proc. SPIE 613, 11 (1986).

79. "Absolute Phase Shift of Phase Conjugators" (with Ian McMichael and Monte Khoshnevisan), Nonlinear Optics and Applications, Pochi Yeh, Ed., Proc. SPIE 613, 32 (1986).

80. "Frequency Shift of Self-Pumped Phase Conjugator" (with M. Ewbank) Nonlinear Optics and Applications, Pochi Yeh, Ed., Proc. SPIE 613, 59 (1986).

81. "Coherent Image Subtraction using Phase-Conjugate Interferometry" (with A.E.T. Chiou and M. Khoshnevisan), Nonlinear Optics and Applications, Pochi Yeh, Ed., SPIE 613, 201 (1986).

82. "Exact Solution of a Nonlinear Model of Two-Wave Mixing in Kerr Media," J. Opt. Soc. Am. B3, 747 (1986).

83. "Possibility of Relative Position Sensing by using Double-Phase Conjugate Resonators" (with M. Khoshnevisan, M.D. Ewbank and J. Tracy), Opt. Comm. 57, 387 (1986)

84. "Parallel Image Subtraction using Phase-Conjugate Michelson Interferometer" (with A.E.T. Chiou), Opt. Lett. 11, 306 (1986).

85. "Laser-Beam Cleanup Using Photorefractive Two-Wave Mixing and Optical Phase Conjugation" (with A.E.T. Chiou), Opt. Lett. 11, 461 (1986).

86. "A Phase-Conjugate Fiber Optic Gyro" (with I. McMichael and M. Khoshnevisan), Applied Optics 25, 1029 (1986).

87. "Polarization-Preserving Phase Conjugator" (with I. McMichael and M. Khoshnevisan), Opt. Lett. 11, 525 (1986).

88. "Photorefractive Conical Diffraction in $BaTiO_3$" (with M.D. Ewbank and J. Feinberg), Opt. Comm. 59, 423 (1986).

89. "Laser Beam Cleanup by Mode Filtering and Photorefractive Two-Wave Mixing" (with A.E.T. Chiou and M. Khoshnevisan), Tech. Digest, CLEO'86, paper THM2, 308 (June 1986).

90. "Measurements of the Phase of Phase-Conjugate Reflections" (with I. McMichael and M. Khoshnevisan), Tech. Digest, IQEC'86, paper FDD4, 214 (June 1986).

91. "Self-Pumped Phase-Conjugate Fiber-Optic Gyro" (with Ian McMichael), Opt. Lett. 11, 686 (1986).

92. "Double Phase-Conjugate Fiber-Optic Gyro" (with Ian McMichael), J. Opt. Soc. Am. A3(13), 63 (1986).

93. "Observation of Harmonic Phase Conjugation in a Photorefractive Medium" (with Tallis Chang), J. Opt. Soc. Am. A3 (13), 33 (1986).

94. "Stimulated Light Scattering in Photorefractive Crystals" (with M.D. Ewbank, R.R. Neurgaonkar and J. Feinberg), J. Opt. Soc. Am. A3 (13), 33 (1986).

95. "Phase Shift of Photorefractive Gratings and Phase-Conjugate Waves" (with Ian McMichael), Opt. Lett. 12, 48 (1987).

96. "Relationship Between Nonlinear Kerr Effect and Acousto-Optics" (with Monte Khoshnevisan), invited paper, Proc. SPIE 739, 82 (1987).

97. "Phase Conjugation in Semiconductor Lasers" (with Ian McMichael and Monte Khoshnevisan), Proc. SPIE 739, 7 (1987).

98. "Dark Rings in Photorefractive Conical Diffractions" (with Tallis Chang), Proc. SPIE 739, 109 (1987).

99. "Phase-Conjugate Interferometry" (with Wen-Hsien Chen, P.J. Wang, Y.H. Tjung), Proc. SPIE 739, 105 (1987).

100. "Optical Matrix-Vector Multiplication via Four-Wave Mixing in Photorefractive Media" (with A.E.T. Chiou), Opt. Lett. 12, 138 (1987); J. Opt. Soc. Am. A3 (13), 16 (1986); Opt. Lett. 12, 373 (1987).

101. "Fundamental Limit of the Speed of Photorefractive Effect and Its Impact on Device Applications and Material Research," Appl. Opt. 26, 602 (1987).

102. "Real-Time Contrast Reversal Via Four-Wave Mixing in Nonlinear Media" (with A.E.T. Chiou), Opt. Comm. 64, 160 (1987).

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EXHIBIT B

42"H1(V420H1)

Products Overview
LCD TV Panels
Notebook Panels
Monitor Panels
AV & Mobile Panels
Medical Display Panels
Special-application Panels

Model Name	V420H1
Panel Size	42"
Technology	LCS MVA
Resolution	1920x1080
Number of Pixels	2.1M x (R,G,B)
Pixel Pitch(mm)	0.4845
PPI	52
Active Area(mm)	930.2x523.3
Outline(mm) (w/inverter)	983x576x52.3
Luminance(nits)	500
View Angle (U/D/R/L,CR>20)	88/88/88/88
Contrast Ratio	2000:1
Color Depth	8bit (16.7M)
Color Gamut (NTSC)	72%
Response Time(ms)	6.5 (Gray to Gray)
Weight (g)	13300
Power Consumption(W)	170W
Electrical Interface	2ch LVDS

EXHIBIT C

42LG60

42” CLASS LCD 1080P HDTV
(42.0” diagonal)

- Full HD 1080p Resolution
- 50,000:1 Dynamic Contrast Ratio
- TruMotion 120Hz
- 4x HDMI™ V.1.3 with Deep Color
- Intelligent Sensor
- 24p Real Cinema
- AV Mode (Cinema, Sports, Game)
- Clear Voice
- LG SimpLink™ Connectivity
- Invisible Speaker System
- USB 2.0 (JPEG, MP3)
- ISFccc

FULL HD 1080P RESOLUTION
Displays HDTV programs in full 1920 x 1080p resolution for a more detailed picture.

TRUMOTION 120HZ
Advance 120Hz panel provides clearer, smoother images, even during fast action scenes creating a more stable structure for a crisper picture.

INTELLIGENT SENSOR
Unlike other sensors which can only sense brightness of ambient light, LG’s “Intelligent Sensor” uses 4,096 sensing steps to evaluate its surroundings. Using a sophisticated algorithm, the LG processes picture quality elements including brightness, contrast, color, sharpness and white balance. The result is a picture optimized for it’s surroundings, more pleasing to watch and which can also save up to 50% in power consumption.

24P REAL CINEMA
Hi-def movies run at the 24 frames per second speed that they were originally filmed in, making your home-cinema experience one step closer to a “Real Cinema” experience.

CLEAR VOICE TECHNOLOGY
Automatically enhances and amplifies the sound of human voice frequency range to help keep dialogue audible when background noise swells.

42LG60

LCD 1080P HDTV
42" Class (42.0" diagonal)

TECHNICAL SPECIFICATIONS

LCD PANEL	
Native Display Resolution	1920 x 1080p
Brightness (cd/m²)	500
Dynamic Contrast Ratio	50,000:1
Viewing Angle	178° x 178°
Response Time (Grey to Grey)	4ms
Wide Color Control	•
TruMotion 120Hz	•
Life Span (Typical)	60,000 hours
BROADCASTING SYSTEM	
Analog	•
ATSC/NTSC/Clear QAM	•
VIDEO	
XD Engine™	•
Aspect Ratio	16:9
Aspect Ratio Correction	6 Modes
Just Scan (1:1 Pixel Matching)	
- HDMI™	1080p/1080i/720p
- Component	1080p/1080i/720p
- RF	1080i/720p
Enhanced Line Doubler	•
Enhanced Noise Reduction (Video Noise Filter)	• (3D & MPEG)
Color Temperature Control	4 Modes
Black Stretcher (Black Level Enhancer)	•
24p Cinema (Film Mode)	5:5/3:2
Picture Reset	•
AV Mode (Picture & Sound)	3 Modes
Picture Selection Mode	8 Modes
ISFccc	•
Intelligent Sensor Mode	•
DTV Signal Strength Indicator	•
AUDIO	
Mono/Stereo/Dual (MTS/SAP)	•
Audio Outout Power (Watts - THD 10%)	10W + 10W
Speaker System Details	2 Way 4 System (Invisible Speaker)
Dolby® Digital Decoder	•
Surround System Type	SRS TruSurround XT™
Bass/Treble/Balance Controls	•
Auto Volume Leveler	•
Sound Mode	4 Modes
Mute	•
SPECIAL FEATURES	
Intelligent Sensor	•
1080P Source Input	
- HDMI	60p/30p/24p
- Component	60p/30p/24p
- RGB	60p
A/V Input Navigation	•
Auto Navigation	•
Input Labeling	•
Quick View (Previous Channel)	•
TruMotion 120Hz Demo On/Off	•
Picture Still / Freeze	•
Clear Voice (On/Off)	•
Quick Setup Guide	•
Parental Control w/V-Chip	•
Key Lock	•
Closed Caption	•
LG SimpLink™ (HDMI CEC)	•
Trilingual Menus	English/French/Spanish
EZ Menus (High Performance Interface)	•
Channel Add/Delete	•
Favorite Channel	•
Auto Clock	•
Manual Clock	•
On/Off Timer	•
Sleep Timer	•
Auto Off (When no video is present)	•
SIDE AUDIO/VIDEO INPUTS/OUTPUTS	
L/R Audio/Composite Video In	1
HDMI/HDCP In	1
USB 2.0 (Music and Photos only)	1 (JPEG/MP3)
REAR AUDIO/VIDEO INPUTS/OUTPUTS	
RF In (Antenna/Cable)	1

REAR AUDIO/VIDEO INPUTS/OUTPUTS (CONTINUED)	
L/R Audio Out	1
HD Component Video In (Y,Pb,Pr) + L/R Audio	2
Digital Audio Out	2 (1 Coaxial/1 Optical)
HDMI/HDCP Input	3 (V.1.3 with Deep Color)
RGB In (D-Sub 15pin) - PC	1
PC Audio Input	1
RS-232c In (Control/Service)	1
Remote Control In (IR)	1
CABINET/ACCESSORIES	
Cabinet Style	Table Top
Cabinet Color	Glossy Piano-black
Remote Control Type	Universal
Stand Swivel (degrees)	20° / 20°
VESA® Compatible (W x H)	200mm x 200mm
POWER	
Consumption (Typical)	n/a
Stand-by Consumption	>1W
Energy Star Compliant	•
SPECIFICATIONS	
Dimensions w/out stand (W x H x D)	40.9" x 29.4" x 2.4"
Weight w/out stand	45.0 lbs
Dimensions w/stand (W x H x D)	40.9" x 31.3" x 14.9"
Weight w/stand	53.1 lbs
Dimensions w/packaging (W x H x D)	n/a
Weight in package	63.9 lbs
UPC	719192173118
Limited Warranty	1 Year Parts/Labor

DIMENSIONS/REMOTE/INPUTS/OUTPUTS

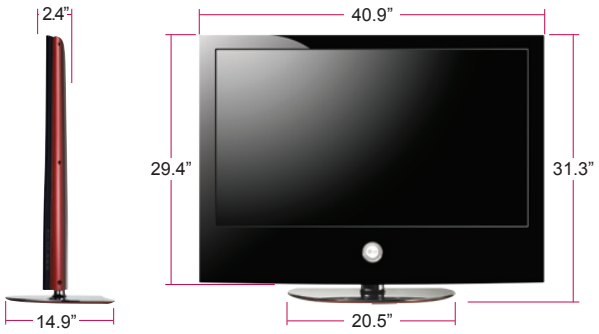

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EXHIBIT D

Samsung SM2032MW 20" LCD TV/Monitor HDTV Ready 1680x1050 1000:1 300cd/m2 RGB/DVI-D/HDMI PIP 3 Years Onsite Warranty Award Winning Monitor/TV

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the best of both worlds..

The SAMSUNG Pebble SM2032MW is a truly stunning widescreen TV Monitor with sleek piano black curves and a crystal clear display. It is the perfect solution to all your digital entertainment needs, with convenient connections for DVD players and game consoles. Plus, with an embedded TV tuner and a superb sound system, you can watch TV with or without a PC in any area of your home or work environment.

key specifications

- Screen Size : 20" Widescreen
- Resolution : 1680 x 1050
- Brightness : 300cd/?
- Contrast Ratio : 1,000:1

Television Picture Features

- Viewable area: 20" wide (16:10)
- Pixel Pitch(mm): 0.258
- Brightness(cd/m2)(typ.): 300 cd/m2
- Contrast Ratio(typ.): 1000:01:00
- Viewing Angle(H/V): 160°/160° (CR>10)
- Response Time(ms)(typ.): 5
- Horizontal Frequency(kHz): 30-81
- Vertical Frequency(Hz): 56-75
- Maximum Resolution: 1680x1050
- Color Supported: 16.7 Mil.
- Plug & Play: DDC 1/2B

- Built-in PAL Tuner
- HDTV Ready

Connectivity
- Analog RGB
- DVI
- HDMI
- Composite
- S-video
- Component
- SCART
- PAL Tuner
- Separate H/V
- Composite

Sound Features
- Type: Built-in
- Multimedia Speakers: 3Wx2ch

Additional Features
- Power Cord
- Audio cable
- Remote Control
- RGB Cable
- Stand Type: Ball Hinge Type
- Function: Simple Stand
- Weight: Set(kg): 5.3/Packing(kg): 6.9
- Set (W*H*D)(mm) (with stand): 493x419x209
- Set (W*H*D)(mm) (w/o stand): 493x368x70
- Packing (W*H*D)(mm): 570x444x140

Specifications

Specification	Value
Product Description	Samsung SyncMaster 2032MW - flat panel display - TFT - 20"
Device Type	Flat panel display / TFT active matrix
Colour	Shining black
Dimensions (WxDxH)	49.3 cm x 20.9 cm x 41.9 cm
Weight	5.5 kg
Diagonal Size	20" - widescreen
Dot Pitch / Pixel Pitch	0.258 mm
Max Resolution	1680 x 1050
Display Positions Adjustments	Tilt
Colour support	24-bit (16.7 million colours)
Response Time	5 ms
Image Brightness	300 cd/m2
Image Contrast Ratio	1000:1 / 3000:1 (dynamic)
Digital Video Standard	Digital Visual Interface (DVI), High-Definition Multimedia Interface (HDMI)
Video Output	TV tuner
Audio Output	Speaker(s) - stereo - integrated
Signal Input	HDMI, DVI-D, VGA
Compliant Standards	CE, DDC-2B, ISO 13406-2, RoHS
Power Consumption Operational	55 Watt
Environmental Standards	EPA Energy Star

View extended Specifications

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